

## ABSTRACT OF THE DISCLOSURE

5 A semiconductor source of emission electrons which uses a target  
of a wide bandgap semiconductor having a target thickness  
measured from an illumination surface to an emission surface.  
The semiconductor source is equipped with an arrangement for  
producing and directing a beam of seed electrons at the  
illumination surface and a mechanism for controlling the energy  
of the seed electrons such that the energy of the seed electrons  
10 is sufficient to generate electron-hole pairs in the target. A  
fraction of these electron-hole pairs supply the emission  
electrons. Furthermore, the target thickness and the energy of  
the seed electrons are optimized such that the emission  
electrons at the emission surface are substantially thermalized.  
The emission of electrons is further facilitated by generating  
negative electron affinity at the emission surface. The source  
of the invention can take advantage of diamond, AlN, BN,  $\text{Ga}_{1-y}\text{Al}_y\text{N}$   
and  $(\text{AlN})_x(\text{SiC})_{1-x}$ , wherein  $0 \leq y \leq 1$  and  $0.2 \leq x \leq 1$  and other wide  
bandgap semiconductors.